REMARKS

In the last Office Action, claims 1-5, 7-9, 11-18 and 28 were rejected under 35 U.S.C. §102(e) as being anticipated by newly cited USPN 5,793,743 to Duerig et al. ("Duerig"), and claims 6, 10, 19-27 and 29-31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Duerig in view of USPN 6,101,164 to Kado et al. ("Kado").

Applicants respectfully submit that the Examiner has misconstrued and misapplied the newly cited Duerig reference and, as explained below, claims 1-31 clearly patentably distinguish over the prior art of record.

The present invention relates to an information recording apparatus having a near-field probe which causes local heating of a recording medium for the purpose of recording data. Sufficient heat energy is produced by radiating heat through the tip of the probe or by using the probe to cause scattering of light with a sufficient intensity to cause local heating.

Independent claims 1, 7, 9, 11, 20 and 28 are each directed to an apparatus or method for recording information on a recording medium (as well as reproducing or reading information from the recording medium). More specifically, in accordance with the present invention, the surface of the recording medium or the probe is illuminated to produce near-

field light. A sharpened tip of the probe is brought into close proximity to the recording medium surface and information is recorded onto the recording medium by locally intensified energy caused by insertion of the probe tip in a region of the near-field light.

Because near-field light is produced on the surface of the recording medium by illuminating the surface of the recording medium, high density recording of information can be achieved without the transmission of light through the recording medium, i.e., even onto an opaque recording medium.

In accordance with another aspect of the present invention, the recording medium is illuminated with light to produce the near-field light. The illuminating light is insufficient by itself to vary the properties of the thin film surface of the recording medium. However, when the probe tip is brought into close proximity to the recording medium, local heating occurs to vary the properties of the thin film and write data to the recording medium.

In the embodiment illustrated in Figs. 10 and 11 of the application drawings, for example, a tip of a probe 26 is inserted in a region of near-field light localized on the surface of a recording medium 3 and caused to access a desired point on the recording medium 3. This causes the near-field light 29 to scatter at the tip of the recording probe 26,

producing scattered light (propagation light) having an intensity distribution greater in a vicinity of the tip of the recording probe 26. Due to this, an intensified energy region 30 is caused to overlap with the energy given off by the localized near-field light 29 at the desired point on the recording medium 3 accessed by the tip of the recording probe 26. The intensified energy region 30 creates sufficient heat energy to cause a phase change film of the recording medium 3 to reach a phase shift temperature at the desired point, which could not be attained by only the energy of the near-field light. Thus, high density information recording is made possible on the recording medium 3.

Claims 1-5, 7-9, 11-18 and 28 have been rejected under 35 U.S.C. §102(e) as being anticipated by Duerig. Of these claims, claims 1, 7, 9, 11 and 28 are independent claims and are all directed to an apparatus or method for recording (as well as reading) information on a recording medium. By contrast, the Duerig apparatus and methods are for only reading -- not recording -- information stored on a magnetic medium. For this reason alone, the anticipatory rejection of claims 1-5, 7-9, 11-18 and 28 is in error and should be withdrawn.

Duerig discloses apparatus and methods for retrieving data stored on a magnetic medium with high

resolution by applying polarized electromagnetic radiation. As shown in the embodiment of Fig. 1A, for example, Duerig discloses a storage medium 1 having a magnetic layer 12 containing stored data in the form of differently orientated magnetized domains. The magnetic layer 12 constitutes one electrode of a tunnel junction, and a tungsten tip 2 constitutes the other electrode.

In use, the tip 2 is brought into close proximity to the storage medium 1 by a piezoelectric actuator (not shown), and the tip 2 and the magnetic layer 12 are connected to a current detector 7 and a voltage source 8. The storage medium 1 is irradiated by a laser diode 3 that emits laser light which is circularly polarized by a quarter-wavelength plate 4, and the circularly polarized light is guided through a focusing lens 5 which produces a spot on the storage medium 1. In the part of the magnetic layer 12 irradiated by the laser spot, electrons are excited sufficiently to tunnel through the gap, and the optical-induced tunneling current is measured by the current detector 7. Due to the magnetic circular dichroism (MCD) effect, the tunneling current is modulated, thereby enabling detection of domains of different magnetization in the magnetic layer 12.

In all of the embodiments disclosed by Duerig, the apparatus or method is used only for retrieving data stored in

a magnetic medium, and the apparatus and method cannot record data on a magnetic medium. This fundamental difference clearly differentiates Duerig from the presently claimed invention, which is directed to recording information on a recording medium.

In the statement of rejection regarding independent claim 1, the Examiner interprets the laser diode 3 of Duerig as the claimed probe for producing or scattering near-field light for reading or recording information. Such an interpretation is incorrect and totally inconsistent with the Duerig disclosure, which describes that the laser diode 3 is a light source which generates laser light that is circularly polarized through the quarter-wavelength plate 4 and guided by the focusing lengths 5 to produce a spot on a magnetic layer 12 to sufficiently excite electrons to tunnel through the gap between the magnetic layer 12 and the tip 2. Stated otherwise, the laser diode 3 does not produce or scatter near-field light for reading or recording information.

Further, in the statement of rejection of claim 1, the Examiner states that the tungsten tip 2 of Duerig corresponds to the claimed heat radiating means for radiating heat through the tip of the probe in the vicinity of the produced or scattered near-field light to heat the desired region of the recording medium to record information thereon.

This is not correct, and the tip of the tungsten tip 2 does not radiate heat energy and certainly does not radiate sufficient heat energy to heat a desired region of the recording medium to record information on the recording medium, as required by claim 1.

With regard to independent claim 7, the statement of rejection refers to the laser beam 23 of Duerig (Fig. 2) as constituting an illumination light source for illuminating a second surface of the recording medium opposite the first surface with illumination light so that a near-field light is produced above the first surface of the recording medium. This is incorrect, and the laser beam 23 is not a source for producing near-field light but rather, like the laser beam 3 of Fig. 1, is a light source for producing laser light that is circularly polarized and focused as a spot on a magnetic layer 212 to excite electrons to produce a tunneling current.

With respect to independent method claims 9 and 11, these are directed to a method of recording information on a recording medium, whereas Duerig discloses only a method of reading or retrieving information stored on a recording medium -- not recording information on the recording medium.

Similarly, with regard to independent claim 28, this is directed to a method for using a scanning probe instrument to record information on a recording medium. Duerig discloses

only methods of using a scanning probe instrument to read or retrieve information stored on a recording medium -- not to record information onto the recording medium.

In the absence in Duerig of the foregoing limitations recited in independent claims 1, 7, 9, 11 and 28, anticipation cannot be found. See, e.g., W.L. Gore & Associates v. Garlock, Inc., 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) ("Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration"); Continental Can Co. USA v. Monsanto Co., 20 USPQ2d 1746, 1748 (Fed. Cir. 1991) ("When more than one reference is required to establish unpatentability of the claimed invention anticipation under § 102 can not be found".); Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 221 USPQ 481, 485 (Fed. Cir. 1984) (emphasis added) ("Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim").

Stated otherwise, there must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skilled in the field of the invention. This standard is clearly not satisfied by Duerig for the reasons stated above. Furthermore, Duerig does not suggest the claimed subject matter and, therefore, would not

have motivated one skilled in the art to modify Duerig's apparatus and method to arrive at the claimed invention.

The dependent claims also include limitations which are not disclosed by Duerig. Claim 2, for example, recites that the heat radiating means comprises an electric heating element provided on the probe for heating the tip of the probe. In the statement of rejection, the Examiner refers to the I/V converter 37 and the voltage source 38 of Duerig as comprising an electric heating element for heating the tip of the probe. The rejection is not at all understood since the I/V converter and voltage source are not described as an electric heating element, do not function as an electric heating element and do not heat the tip of the probe "to heat the desired region of the recording medium to record information on the recording medium" as required by claim 1/2.

Other dependent claims include limitations which are likewise lacking in Duerig. There is simply no disclosure in Duerig of the use of heat radiating means and the use of near-field light as required by claims 1-5, 7-9, 11-18 and 28, and one skilled in the art would not find in Duerig an element-for-element counterpart to the claimed invention.

Claims 6, 10, 19-27 and 29-31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Duerig in view of Kado. However, in the statement of rejection, the Examiner

refers to Muramatsu and Yee, and thus the prior art basis for the rejection of these claims is not understood.

Among these claims, claims 6, 10, 19 and 29-31 are dependent claims which depend, either directly or indirectly, on one of independent claims 1, 7, 9, 11 and 28 and are allowable for the reasons advanced above with respect to the independent claims. Of remaining claims 20-27, claim 20 is an independent claim and claims 21-27 depend, either directly or indirectly, on base claim 20.

Claim 20 is directed to an information recording apparatus and includes a probe having a tip for producing or scattering near-field light above a surface of a recording medium for reading or recording information on the recording medium, and heat generating means for heating a desired region of the surface of the recording medium to change the physical property of the coating material in the desired region to record information on the recording medium. As noted above in the traversal of the anticipatory rejection based on Duerig, Duerig does not disclose an apparatus for recording information on a recording medium nor an apparatus having a probe for producing or scattering near-field light, and the Duerig apparatus is fundamentally different from that recited in claim 20.

Kado discloses a magneto-optical recording and playback device utilizing phase change technology. However,

Kado discloses the use of a conductive probe 4 and fails to disclose or suggest a near-field probe as required by claim 20. More specifically, Kado fails to disclose or suggest the use of a near-field light or the use of a probe which produces or scatters near-field light as required by claim 20.

In the statement of rejection, claim 20 is rejected under 35 U.S.C. §103(a) as being unpatentable over Duerig in view of Kado, however the Examiner only refers to Muramatsu and Yee in discussing the rejection of claim 20. For completeness, applicants will address the patentability of independent claim 20 over Muramatsu and Yee.

Muramatsu discloses a scanning near-field microscope that is capable of only observing a sample. Muramatsu does not disclose or suggest the use of local heating of a sample by the probe to record information on the sample. Applicants respectfully submit that the Examiner has misconstrued Muramatsu by citing reference numeral 33 as being heat radiating means. Element 33 in Muramatsu is means for receiving a laser light 30 and does not radiate heat onto a recording medium as required by claim 20.

Yee is not properly citable as prior art against any claims in the present application. As pointed out in the last response, the present application is a U.S. national stage application of PCT International Application Ser. No.

PCT/JP99/00572, filed February 10, 1999, and claiming a priority date of February 10, 1998. Yee has a U.S. filing date of April 13, 2000 and a priority date of April 15, 1999, which is two months after the priority date of the PCT international application filing date, which, under 35 U.S.C. §363, is the filing date of the present application. The International Bureau communicated the international application to the USPTO on August 19, 1999, as indicated on Form PCT/IB/308 a copy of which was filed with the present application and listed on the transmittal letter. See MPEP §1828.

For the foregoing reasons, the rejection of independent claim 20 as being unpatentable over Duerig, Kado, Muramatsu and/or Yee is in error and should be withdrawn. Claims 21-27 all depend, either directly or indirectly, on base claim 20 and are thus likewise allowable.

Applicants respectfully point that the claims have not been amended in any respects. Therefore should the Examiner propound a new ground of rejection against any of claims 1-31 in the next Office Action, the action should not be made final as the need for any such new ground of rejection has not been necessitated by any claim amendments made by applicants.

In view of the foregoing, favorable reconsideration and allowance of the claims are respectfully requested.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Applicants

By: _____
Bruce L. Adams
Reg. No. 25,386

50 Broadway - 31st Floor
New York, NY 10004
(212) 809-3700

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Debra Buonincontri
Name

Debra Buonincontri
Signature

November 29, 2004
Date